Approaching the affective factors of information seeking: the viewpoint of the information search process model

Reijo Savolainen

School of Information Sciences, Kanslerinrinne 1, 33014 University of Tampere, Tampere, Finland

Abstract

Introduction. The article contributes to the conceptual studies of affective factors in information seeking by examining Kuhlthau's information search process model.
Method. This random-digit dial telephone survey of 253 people (75% female) living in a rural, medically under-serviced area of Ontario, Canada, follows-up a previous interview study to examine with a larger sample issues related to searching for and using health information.
Analysis. Concept analysis focusing on the ways in which the categories of feelings and mood are explicated in the information search process model. In addition, it was examined how the motivational elements of information seeking are conceptualised in the categories of feelings and mood. To this end, the present study drew on the ideas of the appraisal theories - a major approach to the study of the affective phenomena.
Results. Kuhlthau's model provides a rich and credible picture of feelings experienced by information seekers at various stages of the information search process. However, the category of feelings is approached descriptively. Within this category, the motivational elements are incorporated in the factor ofinterest. In the information search process model, the category of mood is conceptualised more analytically by drawing on Kelly's ideas. The findings indicate that the picture of the motivational elements of mood can be elaborated by examining the invitational and indicative mood in terms of action readiness.
Conclusions. The model provides a pioneering contribution to the conceptualisation of the affective factors in information seeking. The picture of these factors can be elaborated further by conducting comparative studies and making use of the ideas obtained from psychological and cognitive theories of emotion.

Introduction

Information scientists have acknowledged the importance of the affective factors since the 1980s. Wilson (1981) pioneered by conceptualizing affective need as one of the drivers of information seeking, while Dervin (1983) drew attention to the role of emotions and feelings in sense-making. The pioneers include Kuhlthau (1983;1991) whose lnformation search process model incorporated the affective, cognitive and action-related factors of information seeking. As a whole, however, minimal interest has been directed to the affective factors in information seeking since the 1990s. As Fisher and Landry (2007: 211) aptly put it, '*affect as a lens for understanding information behaviour has always lurked predominantly in the field's theoretical shadows*'. Savolainen (2011) identified a similar bias in the conceptualisations of the categories of information need and uncertainty.

In recent years, however, there is an increasing interest in the study of affective phenomena of information behaviour. This interest is exemplified by the American Society for Information and Science and Technology (ASIS&T) volume,*Information and emotion: the emergent affective paradigm in information behavior research and theory*, edited by Nahl and Bilal (2007). Recent contributions also include Fulton's (2009) study of the role of the positive affect in information seeking among genealogists. Lopatovska and Arapakis (2011) provide an excellent overview to the studies of affective factors in the contexts of information retrieval, information searching and human-computer interaction.

The present article contributes to the study of the affective factors in information-seeking behaviour by focusing on the information search process model developed by Kuhlthau. The model is based on a series of empirical studies refining the initial framework developed in the early 1980s (Kuhlthau 1983; 1988; 1991; 1993;2004). Kuhlthau's model was chosen for review because it provides one of the most sophisticated conceptualisations of the affective factors in information-seeking behaviour. As to the analytical depth, Nahl's (2007a; 2007b) social-biological information technology model is perhaps the closest rival. Because of space restrictions, however, the comparison of the above models is not feasible in the present study.

The present study is structured as follows. First, to provide background, the overall nature of affective factors will be characterised. Then, the research design will be specified. The findings will be reported in subsequent sections focusing on the ways in which affective factors have been conceptualised in Kuhlthau's model. The last chapters discuss the main findings and draw conclusions of their significance.

Approaches to affective phenomena

There are a number of competing viewpoints to affective phenomena and no consensus has been reached among researchers about the nature of emotions, for example (Cowie *et al.*, 2011). Somatic theories of emotion argue that bodily responses cause emotional reactions while appraisal theories suggest that emotions

result from the evaluation of events occurring in the daily environment. Depending on the philosophical and theoretical point of departure, emotions can be defined, for example, as physiological processes, perceptions of physiological processes, neuro-psychological states, evaluative judgments, or social facts (de Sousa, 2012). The multiplicity of approaches is partly due to the different definitions of the terms *affect*, *emotion*, and *feeling*, as well as a host of other terms such as*preference* and *mood* (Mulligan and Scherer, 2012, p. 346).

Even though there is no generally agreed definition of affective factors and their relationships, the characterisation presented by Davidson and associates (2003, p. xiii) can be used to give background for the present study. In their view, *affective phenomena* can be divided into six main categories as follows:

- *Emotion* refers to a relatively brief episode of coordinated brain, autonomic and behavioural changes that facilitate a response to an external or internal event of significance for the organism
- *Feeling* is a subjective representation of an emotion. Feelings can reflect any or all of the components that constitute emotion.
- *Mood* typically refers to a diffuse affective state that is often of lower intensity than emotion but considerably longer in duration.
- *Attitudes* are relatively enduring, affectively coloured beliefs, preferences and predispositions toward objects and persons.
- *Affective style* refers to relatively stable dispositions that bias an individual toward perceiving and responding to people and objects with a particular emotional quality, emotional dimension, or mood.
- *Temperament* refers to particular affective styles that are apparent early in life and thus may be determined by genetic factors.

Researchers have developed different approaches to categories such as these. For example, the category of mood has been investigated from the perspective of *feeling theories* and *dispositional theories* (Siemer 2009). The former theories suggest that moods are 'raw feelings', i.e., intrinsically objectless phenomenal experiences and that such feelings make up the core of object-directed emotions. For example, if an individual is in an angry mood, she just feels angry but is unable to know why or what precisely she is angry about. The latter theories propose that moods are temporarily heightened dispositions to make particular kinds of emotion-relevant appraisals that correspond to the mood. For example, an individual in an angry mood has a temporarily heightened tendency to react with anger to almost everything that happens to her.

Similarly, two main theoretical perspectives on emotion can be identified. *Discrete emotion* theorists suggest the existence of six or more basic emotions (happiness, sadness, anger, fear, disgust, and surprise), which are universally displayed and recognised (Lopatovska and Arapakis 2011, p. 576). The *continuous approaches* contrast sharply with such categorical definitions that posit a limited number of qualitatively distinct basic emotions (Ellsworth and Scherer 2003, p.

574). The proponents of continuous approaches assume the existence of two or more dimensions that describe and distinguish between different emotions. According to this view, emotions can be better approached by using dimensions such as positive vs. negative or pleasant vs. unpleasant rather than drawing on a small number of discrete emotional categories (Lopatovska and Arapakis 2011, p. 576-577).

Since the 1980s, the *appraisal approach* has become a major theoretical perspective in the study of emotion. The basic premise of appraisal theories is that the organism's evaluation of its circumstances (current or remembered or imagined) plays a crucial role in the elicitation and differentiation of its emotions (Ellsworth and Scherer 2003, p. 573). Generally, the first appraisal in the sequence is that of novelty - something in the environment (physical, social, or mental) changes, and the organism's attention is attracted. Often, the next step is a sense of intrinsic pleasantness or unpleasantness. Especially when the valence is negative, further appraisals ensue, and the emotional experience changes from '*feeling good*' or '*feeling bad*' to some more differentiated state (Ellsworth and Scherer 2003, p. 573-574).

Appraisal theories can be described as taking a functional approach to emotions, insofar as appraisals lead to reactions whose function is to deal with specific situation types having some significance for an individual (de Sousa, 2012). It can be claimed that the information processing component of emotion is the most important one in a certain sense. Its main function is the appraisal of the relevance and the implications of an event for the individual. Thus, thanks to appraisal, emotions and feelings have a motivational force that typically produces states of action readiness to help organisms adapt to or deal with important events in their lives (Mulligan and Scherer 2012, p. 352). Action readiness refers to a motivational state pertinent to one's relationship to some object appearing in a situation or in the context of an event. The motive state aims to establish, maintain, or modify one's relationship with the external world as a whole, with an object in that world, or with an object of thought or imagination. Action readiness can include a variety of modes. Positive modes include *approach* (moving toward an object), and *attending*(wanting to pay attention to an object). Negative modes of action readiness can be exemplified by *rejection* (not wanting to do anything with an object) and *avoidance* (moving away from an object) (Frijda *et al.*, 1989).

Research design

The above review demonstrated that affective phenomena are constituted by a complex set of emotions, feelings and moods that are approached differently from the perspective of diverse theories. Unfortunately, it was not possible to find among them any single theory that could be used as a framework against which to mirror the assumptions of Kuhlthau's information search process model so that full justice could be done to her ideas.

However, the review of the approaches to emotion and mood provided useful background for the conceptual analysis. First, it was possible to put Kuhlthau's conceptualisations in a broader context to investigate the specific features of the information search process model. Second, the ideas of the appraisal theories appeared to be useful for the study of the motivational elements of the affective factors explicated in Kuhlthau's model. More specifically, put in the context of information seeking, the appraisal theories suggest that an individual, for example, a student considering possible topics for an essay, appraises the relevance of a novel source of information. The appraisal elicits the sense of pleasantness or unpleasantness dependent on how the new source is expected to help in task performance. The positive or negative emotion thus experienced gives rise to a motivational state, thus producing action readiness to access the source or to ignore it.

Drawing on the above ideas, the present study addresses the following research questions:

- In which ways are the affective factors of information-seeking behaviour conceptualised in Kuhlthau's information search process model?
- How are the motivational elements of the affective factors conceptualised in the above model? Can such conceptualisations be elaborated further by drawing on the ideas of the appraisal theories?

To strengthen the focus of the study, a few limitations appeared to be necessary. Although Kuhlthau ([1993, p. 348](#)) reminds us that '*information seeking is a holistic experience with thoughts, actions and feelings interwoven into a complex mosaic rather than separate distinct entities*', the present study concentrates on the affective factors only. Thus, for example, the relationships between the cognitive and affective factors will not be reviewed in detail. Second, no attempt will be made to compare Kuhlthau's model to other frameworks conceptualizing the affective factors of information seeking. These limitations are reasonable since it became evident that the above topics would have taken an article of their own.

Research material and analysis

To create an overall picture of the studies on affective factors in information seeking, an extensive literature search was conducted in the first phase of the study. To this end, databases such as EBSCO, LISA and ERIC were searched by using a variety of keywords, for example, affect, affective, emotion, information searching, and information seeking. In addition, major review articles focusing on information needs, seeking and use were consulted; these articles are mainly published in the volumes of the *Annual Review of Information Science and Technology* since 1966. In this way, eighty-five relevant documents were identified.

In order to strengthen the focus of the study, the main attention was directed to the information search process model. For this purpose, Kuhlthau's studies since the

1980s were scrutinised with a specific emphasis on the affective factors in information searching or seeking. The material was analyzed by means of conceptual analysis by devoting attention to how Kuhlthau and other researchers drawing on the information search process model have conceptualised affective phenomena and their relationships. In the first phase of the conceptual analysis, relevant parts of the documents characterizing affective factors such as feeling and mood in the context of the information search process model were identified. Then, attention was devoted to how the elements of such factors and their relationships are generally defined and how in particular the motivational elements of these factors are characterised, seen from the viewpoint of appraisal theories. In this context, attention was also paid to how the affective factors and their relationships are illustrated by drawing on the findings of empirical studies. Finally, the conceptualisations and their empirical illustrations were compared to find similarities and differences. Since the most recent conceptualisation of the information search process model is presented in the second edition of Kuhlthau's book *Seeking meaning* ([Kuhlthau, 2004](#)), the conceptual analysis mainly concentrated on the above work.

The nature of the affective factors in the information search process

Kuhlthau's model does not focus on the affective phenomena alone since they are discussed in combination with the cognitive and conative (action-related) factors. This approach enables a holistic view on how people seek and use information in work task-related contexts in particular. Kuhlthau's conceptualisations of the affective phenomena draw heavily on Kelly's ([1963](#)) personal construct theory. Although Kelly focused on the nature of human thinking and learning as construction processes, he also characterised the nature of feelings and mood in the above context. He maintained that the feelings of confusion influence the construction processes particularly at the initial phases when individuals are involved in the process of constructing meaning from the information they encounter.

Similarly, Kuhlthau ([2004, p. 25](#)) assumed that affective experiences play a significant role throughout the process of construction and information seeking. The picture of the interplay of the affective and cognitive factors is crystallised in the*Uncertainty principle* ([Kuhlthau 1993, p. 347](#)):

> *Uncertainty is a cognitive state that commonly causes affective symptoms of anxiety and lack of confidence. Uncertainty and anxiety can be expected in the early stages of the information search process. The affective symptoms of uncertainty, confusion and frustration are associated with vague, unclear thoughts about a topic or question. As knowledge states shift to more clearly focused thoughts, a parallel shift occurs in feelings of increased confidence. Uncertainty due to a lack of understanding, a gap in meaning, or a limited construct initiates the process of information seeking".*

The uncertainty principle explicates one of the main tenets of the information search process model, namely the assumption of the progression of feelings at various stages of the information search process. Based on the empirical findings of students' information-seeking behavior Kuhlthau ([2004, p. 41](#)) concluded that the feelings described by the students correspond to emotions assigned to Kelly's phases of construction. The cognitive factors (thoughts) also appeared to develop during the information search process in ways predicted by Kelly's theory. As a result, Kuhlthau's model identifies the relationships between affective, cognitive and conative factors of information seeking. Since the present study focuses on the affective factors, the model depicted in Table 1 is simplified by leaving out the specification of the category of conative factors, that is, actions related to information seeking. In addition, the description of the category of *thoughts*has been condensed to some extent.

Stages in information search process	Thoughts	Feelings	Mood
Task initiation	Contemplating assignment Comprehending task	Apprehension at work ahead Uncertainty	Primarily invitational
Topic Selection	Weighing topics against criteria of personal interest, project requirements, information available and time alloted	Confusion Sometimes anxiety Brief elation after selection Anticipation of prospective task	Primarily indicative
Prefocus exploration	Becoming informed about general topic	Confusion Doubt Sometimes threat Uncertainty	Primarily invitational
Focus formulation	Predicting outcome of possible foci using criteria of personal interest	Optimism Confidence to complete task	Primarily indicative
Information collection	Seeking information to support focus	Realisation of extensive work to be done Confidence in ability to complete task Increased interest	Combination of indicative and invitaional
Presentation/	Identifying	Sense of relief Sometimes

Search closure	need for any additional information	satisfaction Sometimes disappointment	Indicative

Table 1: The Information search process model (Kuhlthau 2004, p. 44-50)

Kuhlthau conceptualises the affective factors by using the categories of *feeling* and *mood*. The model suggests that thoughts become more focused along with the information search process, while feelings experienced by the information seekers vary at the individual stages. The overall trend is, however, toward positively coloured feelings. The prevailing mood, invitational or indicative also varies from stage to stage. An invitational mood tends to be more appropriate at the early stages of the information search process and an indicative mood at the later phases of the information seeking process. To elaborate the picture of the affective factors, the conceptualisations of the categories of feeling and mood will be discussed in greater detail below.

Feelings

Following Kelly's terminology, Kuhlthau prefers the concept of feeling, not emotion. This suggests that the main emphasis is placed on the subjective representations of emotions (cf. Davidson *et al.* 2003, xiii). Interestingly, Kuhlthau does not define the concept of feeling in greater detail and this category is not reflected in the light of theories of emotion, for example. The category is approached descriptively by identifying a number of individual feelings, for example, anxiety, confusion, doubt and uncertainty. Further, feelings such as these are mainly approached as separate entities; their relationships are seldom reflected. The only exception can be found in the context of the Interest corollary. Kuhlthau (2004:101) proposes that the feeling of personal interest is expected to increase as the feelings of uncertainty decrease.

Despite the descriptive approach, Kuhlthau provides a rich and credible repertoire of feelings experienced by information seekers. The main attention is paid to how the feelings vary at various stages of the information search process. However, the progress is not linear from negative to positive feelings since at stage 2 (Topic selection) the feelings of uncertainty may change to temporary optimism. The trend toward negatively coloured feelings commences at Stage 3 (Prefocus exploration) and continues until Stage 4 (Information collection) where it turns again to a positive direction. Importantly, Kuhlthau's (2004, p. 56) empirical studies have not only identified feelings of diverse kinds. The picture has been refined by measuring the perceived strength of the feelings. For example, the feelings of confidence experienced by students were rated on a ten-point scale at three points - initiation, midpoint and closure of the information search process.

Interestingly, Kuhlthau assigns a double role to the category of *uncertainty*. On the one hand, uncertainty is referred to as one of the feelings characteristic of stage 1

(Task initiation) in particular. On the other hand, *uncertainty* is defined as a '*cognitive state*' in the context of the *uncertainty principle*. In the latter role, uncertainty '*causes affective symptoms of anxiety and lack of confidence*' ([Kuhlthau 1993, p. 347](#)). Wilson and his associates ([2002, p. 707](#)) are among the first researchers drawing attention to this conceptual ambiguity. Another category with a double role is *interest*. In an early version of the information search process model, interest, or more specifically '*increased interest*' is referred to as one of the cognitive factors (thoughts) common to the stage of *information collection* ([Kuhlthau 1991, p. 357](#)). In a recent version of the model, however, '*increased interest*' experienced at the stage of *information collection* is located in the category of feelings ([Kuhlthau 2004, p. 49](#)). This suggests that *interest* is a boundary category. Moreover, at the initial stage of the information search process, *interest* also appears in the domain of thoughts in the context where the information seeker weighs '*topics against criteria of personal interest*' ([Kuhlthau 2004, p. 46](#)).

As an affective-cognitive factor, *interest* is particularly relevant because it incorporates motivational elements. The *interest corollary* specifies the nature of this category ([Kuhlthau 2004, p. 101](#)). In general, *interest* deals with the intellectual engagement: personal interest increases as the exploratory inquiry leads to formulation in the information search process. The empirical studies focusing on students' information-seeking behavior confirmed this assumption: motivation resulting from personal interest is more pronounced after the midpoint of the search than at the beginning. According to Kuhlthau ([2004, p. 198](#)), personal interest is an important factor in the choices made, particularly in selecting the topic and formulating a focus. At the initial stage, however, information seekers tend to be motivated by external prompts such as an assignment.

As personal interest is often strengthened at the stages of *prefocus exploration* and *focus formulation*, the external motivation changes to internal motivation. In this way, Kuhlthau identifies a promising perspective to the study of the connections between interest and the nature of intrinsic versus extrinsic motivation (cf. [Deci and Ryan, 1985](#)).

So far, however, these connections are not elaborated further in the studies drawing on the information search process model. Similarly, from the perspective of the appraisal theories, the characterisation of the motivational elements of the category of interest has remained at a general level. These theories suggest that feelings result in the appraisal of the objects and that the motivational state, i.e., action readiness depends on the positive or negative valence of emotion thus elicited. Since Kuhlthau does not specify the degree of interest, for example, high versus low interest, the motivational nature of interest remains fairly unspecific.

Mood

Drawing on Kelly's ([1963](#)) ideas, Kuhlthau has defined the category of mood in

greater depth than that of feelings. However, the conceptualisation is not discussed more broadly in relation to research approaches to mood developed in psychology, for example, feeling theories and dispositional theories (Siemer 2009). Since psychologists tend to approach mood as a diffuse affective state, for example, angry mood or happy mood, Kelly's and Kuhlthau's way to define mood as an attitude deviates from the mainstream. Further, the definition is somewhat ambiguous from the viewpoint of psychology since mood is conceptualised by means of another affective construct, that is, attitude (cf. Davidson *et al.*, 2003, p. xiii).

Kelly (1963) defined mood as an attitude that determines one's approach to the task at hand. He identified two moods in any constructive process: invitational and indicative. *Invitational mood* leaves the person open to new ideas and receptive to change and adjustment according to what is encountered, while *indicative mood* causes the person to depend on the construct he or she presently holds and to reject new information and ideas (Kuhlthau 1991, p. 363). Analogously, Kuhlthau (2004, p. 98) defined mood to as a stand or attitude that a user assumes, opens or closes the range of possibilities in a search. An invitational mood leads to expansive actions, allowing the information seeker to assume a posture of expectancy and enables him or her to take risks and to profit from mistakes. An indicative mood results in conclusive actions, and it leads to closure by limiting expectations and confining the information seeker to the task at hand (Kuhlthau 1991:363). As discussed in more detail below, the mood may shift during the information search process, according to the requirements of the task performance. This is important since assuming a single mood throughout the entire information search process process can obstruct progress at certain points, while the ability to alter mood allows for the accommodation of the different sub-tasks in each of the various stages (Kuhlthau 1993, p. 350).

Kuhlthau (2004:20) also speculates that mood may be envisioned in the context of information seeking '*either as styles and traits that are habitually followed or as strategies or states that arise from a particular problem or stage of the process*'. Drawing on her empirical findings Kuhlthau (2004, p. 99) reflects this issue further: whether moods assumed by information seekers are actually styles that persist across searches with persistent patterns of habits, or are moods attitudes that may be easily changed? However, if mood is understood in this way, it comes close to the category of *affective style* that denotes '*a relatively stable dispositions that bias an individual toward perceiving and responding to people and objects with a particular emotional quality, emotional dimension, or mood* (Davidson *et al.* 2003, p. xiii). Kuhlthau's empirical findings suggested the existence of such styles, that is, evidence of more invitational mood or more indicative mood tendencies. However, they were not so fixed that they could not be adjusted when the students became aware of them as a result of extensive search experience (Kuhlthau 2004, p. 99). Unfortunately, Kuhlthau does not reflect the nature of mood in greater detail. Thus, the question remains about how fruitfully could the category of mood, originally

defined as an attitude or stance, be elaborated from the perspective of qualities such as *habitual style* or *trait*?

The picture of the motivational elements of mood can be elaborated further by drawing on the ideas of the appraisal theories. In which ways would the mood trigger and drive information seeking? Even though appraisal theories traditionally focus on the category of emotions and feelings, Siemer ([2009, p. 262](#)) suggests that the appraisal approaches may be extended to include mood, too. Following this idea, we may assume that mood incorporates motivational elements producing, for example, readiness to accessing additional sources of information, or ignoring them. Obviously, an invitational mood would differ from an indicative mood in this regard. Kuhlthau ([2004, p. 44-50, 98](#)) characterises the roles of mood at various stages of the information search process as follows:

- *Task initiation.* The mood is primarily invitational, and it opens the possibilities within the comprehensive topic or problem and keeps at bay any tendency toward early closure based on insufficient information
- *Topic selection.* The mood is mainly indicative, and it prompts the decision to be made. However, if the users are overly invitational at this point, they are likely to have difficulty settling on a general topic to get their search underway. On the other hand, if they are excessively indicative they tend to choose topics without sufficient investigations and reflection which frequently result in obstacles later on.
- *Prefocus formulation.* An invitational mood is preferred because it opens the search for accomplishing the task of investigating and learning about the general topic to form a focused perspective. An indicative mood at this point may be less productive since it prompts the person to collect rather to explore.
- *Focus formulation.* An indicative mood is preferred because it fosters the closure essential to accomplish the task of narrowing and focusing the general problem area.
- *Information collection.* The indicative mood is also effective in the collection stage when the task centers on gathering information specific to the focused perception of the topic. If the focus is extended, however, invitational mood may serve better the ends of information collection.
- *Presentation or search closure.* The indicative mood aids the user to seek closure in preparation for presenting the information during the last stage, presentation.

Even though Kuhlthau does not refer to the appraisal theories, her characterisations of the nature of mood share the basic idea of these theories: affective factors produce states of action readiness to help the individuals to deal with important choices ([Mulligan and Scherer 2012, p. 352](#)). As Kuhlthau's ([2004, p. 44-59, 98](#)) characterisations suggest, the types of mood incorporate states of action readiness of two kinds. An invitational mood produces the readiness to continue seeking of additional sources of information by '*opening the possibilities within the comprehensive topic*' (stage 1) and '*prompting the person to explore*' (stage 3). In contrast, an indicative mood produces the readiness to stop seeking further

information by '*fostering the closure*' (stage 4), and '*aiding the user to seek closure*' (stage 6), for example.

Nevertheless, Kuhlthau's characterisation of the motivational elements of mood deviates from the full-fledged assumptions of the appraisal theories because the two types of mood are not specified in terms of positive versus negative valence. Invitational or indicative mood are conceptualised as neutral in this regard, and their motivational elements are not based on emotion-relevant appraisals such as pleasant-unpleasant, for example. Second, Kuhlthau's characterisations suggest that ultimately, the appropriateness of a mood - invitational or indicative - depends on the task-based requirements of seeking additional information in various stages of the information search process. Therefore, the motivational elements of mood do not merely originate from internal factors, i.e., states of action readiness but situational, stage-specific requirements such as narrowing the general problem area (stage 4) are also involved.

The relationships between the affective categories

The information search process model remains fairly unspecific about the relationships between feelings and mood. A closer look at these categories reveals no co-variation between feelings and types of mood at the various stages of the information search process. At the initial stage and the stage of *prefocus exploration*, the individuals mainly experience negatively coloured feelings and the mood is primarily invitational. The stage of *topic selection* is also characterised by the negatively coloured feelings, but the mood is primarily indicative. Also, the mood is primarily indicative at the stages of *focus formulation* and *presentation or search closure*, but the feelings are predominantly positive. At the stage of *information collection*, a combination of indicative and invitational mood appears together with predominantly positive feelings.

This suggests that negatively oriented feelings do not necessarily correlate to an indicative mood, which tends to close the range of possibilities in a search for novel ideas or additional sources of information. On the other hand, an invitational mood does not always appear together with positively coloured feelings. Finally, because the connection between the categories of interest and mood is explicitly referred to at the stage of *information collection* only, the question about the relationship between interest and mood remains open, too.

Kuhlthau ([1999, p. 16-17](#)) is aware of the above issues. She points out, for example, that the idea of the preference for an invitational mood at the initial stage of the information search process is counterintuitive. Since this stage is characterised by feelings of uncertainty, we may think that the more uncertain the information seeker feels the more likely he or she is to take on an indicative approach. Kuhlthau ([1999, p. 17](#)) calls for further research to specify the relationships between mood and uncertainty across a variety of contexts. So far, however, this issue has not been

addressed in the studies drawing on the information search process model.

Discussion

Kuhlthau's information search process model provides one of the most sophisticated approaches to the affective factors of information seeking. The conceptualisation of these factors draws heavily on Kelly's ([1963](#)) personal construct theory. This preference yields a focused approach integrating the affective and cognitive elements of information seeking. However, confining the conceptual perspective to Kelly's theory developed in the early 1960s means that the ideas of more recent studies of affective phenomena are not reflected in the model. The information search process model neither discusses the relevance of discrete emotion theories suggesting the existence of six or more basic emotions, nor reflects the ideas of appraisal theories. From this perspective, the repertoire of emotions identified by the information search process model is fairly narrow. Similarly, the information search process model draws on a traditional view on the nature of uncertainty in that the focus is placed on the negative (undesirable) uncertainty causing anxiety among users. Recent studies have shown that there can be a positive impact from uncertainty as well ([Anderson, 2006; Chowdhury *et al.* 2014](#)). Positive (and arguably desirable) uncertainty may influence the information-seeking process, because the individual is motivated by eager anticipation to find new or related sources of information.

Importantly, Kuhlthau has refined the empirical picture of the affective factors by conducting a series of studies focusing on diverse groups such as students, security analysts and lawyers (for an overview, see [Kuhlthau 2004](#)). The findings of the present study indicate variation in the level of depth and specificity of the conceptualisations provided by the information search process model. As a whole, the category of feelings is approached descriptively. Within this category, the concepts of interest and uncertainty are characterised more analytically by qualifying them by affective and cognitive attributes. Further, the concept of *interest* is most relevant from the perspective of the intrinsic motivators of information seeking. However, from the viewpoint of the appraisal theories, the characterisation of the motivational elements of interest has remained quite unspecific because the positive or negative valence of the personal interest is not specified in the information search process model. Thus, it remains unclear how interest would produce states of action readiness. Mood is conceptualised more analytically by drawing on the dimensions of invitational—indicative identified by Kelly ([1963](#)). The findings of the present study suggest that Kuhlthau's way to define this concept is somewhat vague as she assigns to mood diverse attributes like attitude, stance, (habitual) style, trait, strategy and state. In particular, understanding mood as an attitude or habitual trait may be problematic because such factors tend to be relatively stable; as motivational factors they may not capture the stage-specific requirements of the information search process process. Therefore, from the perspective of appraisal theories, the context-specific motivational elements of invitational and indicative moods may be better characterised as states of action readiness.

Interestingly, Kuhlthau's most recent studies have provided further support for the assumptions of the information search process model. In an empirical study examining students' information-seeking behaviour Kuhlthau, Heinström and Todd (2008) confirmed the basic tenet of the model proposing that negative emotions, particularly uncertainty and frustration, are experienced in the beginning and in the middle of the study projects, but at the end they felt satisfied and relieved.

However, the empirical studies conducted by Hyldegård (2006; 2009a;2009b) revealed some variation in the ways in which the affective factors manifest themselves in the particular context of collaborative information seeking among undergraduate students. It appeared that group members did not experience similar emotions as the individual information seekers investigated by Kuhlthau. Hyldegård found that negative feelings such as uncertainty did not only occur in the beginning of the project but they were also experienced in the middle and at the end of the project. This also implies that the nature of uncertainty may change during the information-seeking process: uncertainty experienced in the context of task initiation may differ from uncertainty experienced at the stage of prefocus exploration, for example. Similarly, in an experimental study on collaborative search tasks, Shah and Gonzalez-Ibanez (2010) found that in contrast to Kuhlthau's assumptions, individuals engaged in collaborative information seeking may experience pleasant and unpleasant feelings in each information search process stage, with the predominance of one over the other in certain points. Hyldegård's findings imply that the above differences between individual and collaborative information seeking can be explained by social and task-based factors. Work task and its effect on students' performance seems to be even more complicated when the task is performed in a group-based setting. For example, insufficient familiarity with other group members may influence the presence of negative emotionality.

As emotions refer to relatively brief episodes of behavioural changes that facilitate a response to an external or internal event of significance for the organism, the explanatory or predictive power of emotions in information behaviour is hard to define, due to their elusive nature. Further support for this assumption was obtained from a recent study of emotions as motivational factors for information seeking (Savolainen 2014). The findings suggest that emotions can motivate individuals by triggering action readiness to approach or avoid sources of information. A positive emotional valence is mainly associated with starting and expanding information seeking, even though it also may appear in the context of limiting and terminating information seeking if the individual is satisfied with the outcome. Some emotions, for example anxiety, may motivate in multiple ways, ranging from starting information seeking to information avoidance, while other emotions such as joy are typically experienced while starting or expanding information seeking. It is obvious that strong emotions such as fear or thrill can predict better certain information behaviours while the motivating force of milder emotions such as irritation or curiosity may be fairly weak. In the latter case, the decision to seek or avoid

information may depend more strongly on situational and cognitive factors such as the urgency of a task at hand or human propositional attitudes ([von Eckardt 1996, p. 58-95](#)).

This raises the question whether emotions as motivational factors should be seen as integral parts of the cognitive-representatational system, or should they be considered as a separate, and in some ways, primary response system in its own right? Some researchers argue for a separate-systems view, proposing that affective reactions often precede, and are neuroanatomically and psychologically distinct from cognitive processes, while others espouse a more interactionist conceptualisation. As Forgas ([2000, p. 5](#)) reminds us, the position in debate depends on how broadly the domain of cognition is defined. Affect can be considered a primary and separate response system only is cognition is defined as excluding early attentional and interpretational processes that are inevitably involved in stimulus identification before any response is possible. Ultimately, therefore, the question of whether and to what extent cognition and emotion can be identified as separate categories is a conceptual and definitional issue that cannot be solved by means of empirical research. According to Lazarus ([1999, p. 10-11](#)), a substantial number of researchers have taken the position that cognition and emotion are seamlessly conjoined or fused in nature. For example, Bruner ([1973](#)), one of the main theoretical figures behind Kuhlthau's information search process model, has advocated this viewpoint.

Conclusion

Even though affective factors such as feelings and emotions are ubiquitous elements of information seeking, their study has been largely neglected in information science. Low interest in the affective phenomena is partly due to the predominance of the cognitive approach to information behaviour. Another reason may be the difficulty of the topic. As the analysis of the information search process model indicated, affective phenomena tend to be elusive and they are difficult to conceptualise exactly. It is obvious that such problems are faced by pioneering researchers in particular. The conceptual problems are rendered more difficult in that the category of affective phenomena is not clear-cut. Major concepts such as *interest*, *relevance* and *uncertainty* incorporate both affective and cognitive elements.

The study of the affective factors in information seeking may be elaborated by making use of the ideas obtained from the theories of emotion, for example, appraisal theories ([Ellsworth and Scherer, 2003](#); [Mulligan and Scherer 2012](#)). Since the present study focused on the review of Kuhlthau's model only, there is a need to refine the findings by making comparative studies. For this purpose, Nahl's ([2007b](#)) social-biological technology model is particularly interesting because it incorporates the elements of the appraisal theories.

In future studies, there is also a need to devote attention to other factors constitutive

of the affective phenomena of information seeking, for example, self-efficacy and emotional barriers of information seeking. The analysis of such factors is also relevant in the context of information avoidance (Sairanen and Savolainen 2010). Further, the research setting may be extended, for example, by investigating how the roles and functions of the affective factors of information seeking have been approached in library and information science (cf. Dervin and Reinhard 2007). Further studies may also be needed to elaborate the picture of the affective factors in information use, as exemplified by Nahl's (2007a;2007b) pioneering investigations. Apparently, studies such as these would provide opportunities for enriching the predominantly cognitive approaches to information behaviour.

About the author

Reijo Savolainen (PhD, 1989, University of Tampere, Finland) is currently Professor at the School of Information Sciences, University of Tampere, Finland. He can be contacted at reijo.savolainen@uta.fi

References

Anderson, T.D. (2006). Uncertainty in action: observing information seeking within interactive processes of scholarly research. *Information Research, 12*(1), paper 283. Retrieved from http://InformationR.net/ir/12-1/paper283.html (Archived by WebCite® at http://www.webcitation.org/6RigvyFQe)

Bruner, J. (1973). *Beyond the information given: studies in the psychology of knowing*. New York, NY: W.W. Norton.

Chowdhury, S., Gibb, F. & Landoni, M. (2014). A model of uncertainty and its relation to information seeking and retrieval (IS&R). *Journal of Documentation, 70*(4), 575 -604.

Cowie, R., Sussman, N. & Ben-Ze'ev, A. (2011). Emotion: concepts and definitions. In: P. Petta *et al.* (Eds.), *Emotion-oriented systems* (pp. 8-31). Berlin: Springer.

Davidson, R.J., Scherer, K.R. & Goldsmith, H.H. (2003). Introduction. In: R.J. Davidson, K.R. Scherer & H.H. Goldsmith (Eds.), *Handbook of affective sciences* (pp. xii-xvii). Oxford: Oxford University Press.

Deci, E.L. & Ryan, R.M. (1985). *Intrinsic motivation and self-determination in human motivation*. New York, NY: Plenum Press.

Dervin, B. (1983). *An overview of Sense-Making research; concepts, methods and results to date*. A paper presented at the International Communication Association Annual Meeting, Dallas, Texas, May 1983 (unpublished manuscript).

Dervin, B. & Reinhard C.D. (2007). How emotional dimensions of situated information seeking relate to user evaluations of help from sources: an exemplar study informed by sense-making methodology. In: D. Nahl & D. Bilal (Eds.), *Information and emotion. The emergent affective paradigm in information behavior research and theory* (pp. 51 84). Medford, NJ: Information Today, Inc.

von Eckardt, B. (1996). *What is cognitive science*. Cambridge, MA: The MIT Press.

Ellsworth, P.C. & Scherer, K.R. (2003). Appraisal process in emotion. In R.J. Davidson, K.R. Scherer and H. Goldsmith (Eds.), *Handbook of affective sciences* (pp. 572-594). Oxford: Oxford University Press.

Fisher, K.E. & Landry, C.F. (2007), Understanding the information behavior of stay-at-home mothers through affect. In: D. Nahl and D. Bilal (Eds.), *Information and emotion. The emergent affective paradigm in information behavior research and theory* (pp. 211-233). Medford, NJ: Information Today, Inc.

Forgas, J.P. (2000). Introduction. The role of affect in social cognition. In J.P. Forgas (Ed.),*Feeling and thinking. The role of affect in social cognition* (pp. 1-27). Cambridge: Cambridge University Press.

Frijda, N.H., Kuipers, P. & ter Schure, E. (1989). Relations among emotion, appraisal, and emotional action readiness. *Journal of Personality and Social Psychology, 57*(2), 212-228.

Fulton, C. (2009). The pleasure principle: the power of positive affect in information seeking. *Aslib Proceedings, 61*(3), 245-261.

Hyldegård, J. (2006). Collaborative information behaviour - exploring Kuhlthau's lnformation search process model in a group-based educational setting. *Information Processing & Management, 42*(1), 276-298.

Hyldegård, J. (2009a). Beyond the search process - exploring group members' information behavior in context. *Information Processing & Management, 45*(1), 142 158.

Hyldegård, J. (2009b). [Personality traits and group-based information behaviour: an exploratory study.](http://InformationR.net/ir/14-2/paper402.html) *Information Research, 14*(2). Retrieved 23 January 2014 from http://InformationR.net/ir/14-2/paper402.html (Archived by WebCite® at http://www.webcitation.org/6Rij7W0nn)

Kelly, G. (1963). *A theory of personality: the psychology of personal constructs*. New York, NY: W.W. Norton.

Kuhlthau, C.C. (1983). *The library research process: case studies and interventions with high school seniors in advanced placement English classes using Kelly's theory of constructs*. Unpublished doctoral dissertation. Rutgers University, New Brunswick, NJ, USA

Kuhlthau, C.C. (1988). Developing a model of the library search process: cognitive and affective aspects. *Reference Quarterly, 28*(2), 232-242

Kuhlthau, C.C. (1991). Inside the search process: information seeking from the user's perspective. *Journal of the American Society for Information Science, 42*(5), 361-371.

Kuhlthau, C.C. (1993). A principle of uncertainty for information seeking. *Journal of Documentation, 49*(4), 339-355.

Kuhlthau, C. C. (1999). Investigating patterns in information seeking: concepts in context. In: T.D. Wilson & D. Allen (Eds.), Exploring the contexts of information behaviour.*Proceedings of the 2nd International Conference on Research in Information Needs, Seeking and Use in Different Contexts, 13-15 August 1998, Sheffield, UK* (pp. 10-20). London: Taylor Graham.

Kuhlthau, Carol C. (2004). *Seeking meaning. A process approach to library and information services*. 2nd ed. Norwood, NJ: Ablex.

Kuhlthau, C.C., Heinström, J. & Todd, R.J. (2008). [The 'information search process' revisited: is the model still useful?](http://informationr.net/ir/13-4/paper355.html) *Information Research, 13*(4). Retrieved 23 January 2014 from http://informationr.net/ir/13-4/paper355.html (Archived by WebCite& at http://www.webcitation.org/6RijQobyD)

Lazarus, R.S. (1999). The cognition-emotion debate: a bit of history. In T. Dalgleish & M.J. Power (Eds.), *Handbook of cognition and emotion* (pp. 3-19). Chichester, UK: John Wiley.

Lopatovska, I. & Arapakis, I. (2011). Theories, methods and current research on emotions in library and information science, information retrieval and human-computer interaction. *Information Processing & Management, 47*(4), 575-592.

Mulligan, K. & Scherer, K.R. (2012). Toward a working definition of emotion. *Emotion Review, 4*(4), 345-357.

Nahl, D. (2007a). The centrality of the affective in information behavior. In: D. Nahl & D. Bilal (Eds.), *Information and emotion. The emergent affective paradigm in information behavior research and theory* (pp. 3-37). Medford, NJ: Information Today, Inc.

Nahl, D. (2007b). Social-biological information technology: an integrated conceptual framework. *Journal for the American Society for Information Science and Technology, 58*(13), 2021-2046.

Nahl, D. & Bilal, D. (Eds.) (2007). *Information and emotion: the emergent affective paradigm in information behavior research and theory*. Medford, NJ: Information Today, Inc.

Sairanen, A. & Savolainen, R. (2010). Avoiding health information in the context of uncertainty management. *Information Research, 15*(4). Retrieved 23 January 2014 from http://InformationR.net/ir/15-4/paper443.html (Archived by WebCite& at http://www.webcitation.org/6Rijcjgvn)

Savolainen, R. (2011). Elaborating the motivational attributes of information need and uncertainty. *Information Research, 17*(2). Retrieved 23 January 2014 from http://InformationR.net/ir/17-2/paper516.html (Archived by WebCite® at http://www.webcitation.org/6Rijmj5X2)

Savolainen, R. (2014). Emotions as motivators for information seeking: a conceptual analysis. Library & *Information Science Research, 36*(1), 59-65.

Shah, C. & Gonzalez-Ibanez, R. (2010). Exploring collaborative information seeking processes in collaborative search tasks. In: *Proceedings of the Annual Meeting of the American Society for Information Science and Technology*, Pittsburgh, PA, October 22-27, 2010. Retrieved from http://www.asis.org/asist2010/proceedings/proceedings/ASIST_AM10/submissions/21 Final_Submission.pdf (Archived by WebCite® at http://www.webcitation.org/6RijzAaUw)

Siemer, M. (2009). Mood experience: implications of a dispositional theory of moods. *Emotion Review, 1*(3), 256-263.

de Sousa, R. (2012). Emotion. In: E.N. Zalta (Ed.), *The Stanford encyclopedia of philosophy*. Retrieved 23 January 2014 from http://plato.stanford.edu/archives/spr2012/entries/emotion/ (Archived by WebCite® at http://www.webcitation.org/6RikLjSmZ)

Wilson, T.D. (1981). On user studies and information needs. *Journal of Documentation, 37*(1), 3-15.

Wilson, T.D., Ford, N., Ellis, D., Foster, A. & Spink, A. (2002). Information seeking and mediated searching study. Part 2. Uncertainty and its correlates. *Journal of the American Society for Information Science and Technology, 53*(9), 704-715.